The Discrete Model of the Flow Manufacturing System

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Abstract- *The present study focuses on the study of flow manufacturing system, which is similar to the batch production systems as the function of the time and the resources. With the major advantage of the batch manufacturing production that can process a large amount of same part and have the foundation associativity of the Kanban and just in time principles. The discrete model was been built to study the performance of the system to leverage the process efficiency.*

Keywords-Flow manufacturing, Kanban system, discrete model.

I. INTRODUCTION

The manufacturing is the basic and most important part of the product life cycle. In order to meet the demand of the client or the commercial market the agile of production need to be increased, the dependency of the manufacturing systems depends upon the product quantity and the quality, in order to get the high productivity by the large product quality the batch production helps in front. The continuous flow manufacturing is similar to that of the production line but the products need to pass form the all the required machining in the sequential line. This process is best suited for the pharmaceuticals, the chemical industry, and the plastic industry and applied to the electronics industry. The disadvantage of this kind of the manufacturing system is that the lake of processing the additional material to the furnish product so there has to be a standard part to apply the continuous manufacturing. The continuous manufacturing requires the less investment the size of the process line dependents upon the product complexities. The continuous manufacturing is completely an automated but the chance of having the semi-automated is possible

The discrete model is the empirical process that include the queues, the source functions, and the condition looping sequences the entire process is model in the time domain and by coupling conditions the entire process model was been built virtually that mimic the actual process.

II. LITERATURE REVIEW

The various models of the continuous production system has been Exact and approximate methods for obtaining quantitative measures of performance are reviewed (Jussieu 1992). By replacing the normal flow lines with the u shaped production lines, the mathematical model has been examined and the further trends of the such systems are reviewed(Miltenburg 2001). The application of the flow manufacturing with the optimized planning policies for thr flexible manufacturing has been studied using the numerical model in order to increase the good yield of the system.(Kimemia and Gershwin 1985). The performance of the two heuristic algorithms are used compared by applying them to the flow manufacturing and the new procedure has been proposed which is the Tabu search and have better results from the simulated annealing algorithm (VAKHARIA 1993). The advantage of the choosing the flow manufacturing with the convectional assembly manufacturing and by modification of cell structure planning has been studied (Naga Sai Ram.Gopisetti,Akhil.P, Sudhanshu Chouhan.G 2016).

III. METHODOLOGY

The initial model of simulating the cellular manufacturing production line with the similarity in the continuous manufacturing principals has been taken as the reference to bring out the study(Naga Sai Ram.Gopisetti,Akhil.P, Sudhanshu Chouhan.G 2016). The model, which is taken into study, was the production system, which has about the four machining station which are inter connected by the conveyor belt. The machining station is made to sub model internally and the there are about three buffer station to queue the parts thorough the system. The parts are made to flow through the system at the function of the random exponential value of 1 and the each machining station is modelled as the size delay that is that the all the arts are queued and the processing of the parts is made by one buy on that is one processing action act instant time. The costing profit made by the function that calculate the amount of profits made by the facility along with the detail statistics.

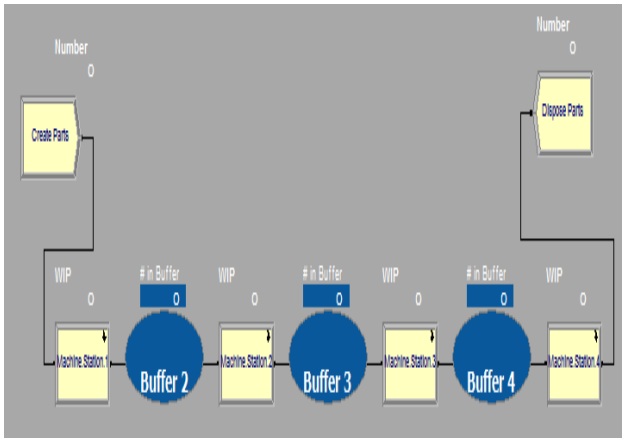

Figure 1 the discrete model of the continuous flow manufacturing system.

The cost validation function is given as follows for the continuous manufacturing.

$$T_p = c_{throughput} \cdot \sum P_t - c_{machning} \cdot \sum M_n - c_{movement} \cdot \sum Pos$$

Where T_p is total profit, $c_{throughput}$ and $c_{machning}$ $c_{movement}$ are the cost of throughput time and machine per hour cost and the movement cost. The total machining parameters given as follows.

Si.No	Attribute	Value	Time
Machining center			
1	Station 1	3 substation	3
2	Station 2	9 substations	5
3	Station 3	15 substations	8
4	Station 4	11 substations	6
Buffer line			Waiting number
1	Buffer 2	--	5
2	Buffer 3	--	6
3	Buffer 4	--	1

The model made to run for the time of the 10 hours and the performance statistics are recorded as the results.

III. RESULTS

The performance results that taken into consideration are the input output performance of the system in terms of number of the finished products from the system. The total number of the processed part, which taken from the system, are of 47.

Table 1 The waiting of the parts in the ques is given as follows.

Si.no	Attribute	Waiting time (sec)
1	Buffer 2	1.67
2	Buffer 3	0
3	Buffer 4	0.16
4	Machining station 2	2.81
5	Machining station 3	1.17
6	Machining station 4	0.24
7	Processing at station 1	23.16

Table 2The entry of parts in the waiting lines is given as follows.

Si.no	Attribute	Number
1	Enter buffer 2	2.91
2	Enter buffer 3	0.00
3	Enter buffer 4	0.31
4	Enter machine station 2	5.00
5	Enter machine station 3	2.14
6	Enter machine station 4	0.43

Table 3The total resources that have been used by the each station is given as follows

attribute	Utilization	Busy	Seized
Buffer 2	1	5	64
Buffer 3	0.36	2.14	64
Buffer 4	0.13	0.43	59
Station 1	1	3.00	64
Station 2	1	9	64
Station 3	0.95	14.28	64
Station 4	0.83	9.16	58

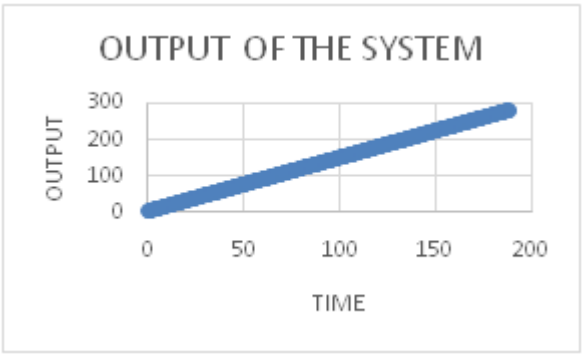

figure 2 the outflow of the flow manufacturign system

IV. CONCLUSION

From the above study, we have seen the numerical model of the continuous manufacturing system in terms of the discrete event simulation has made a good impact on the overall performance of the system. In addition, there has been increase in the overall performance of the system. With reference from the table 2 it is clear that the number of item sin the waiting time has been decreased over and the from the table 3 the number of busy station has been utilized over full potential with the main buffers acting as neutrals server regions that balances the schedule nonlinearities.

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